IN THE CLAIMS:

Claims 1 – 23 (Non-elected, with Traverse)

24. (Currently Amended) A direct oxidation fuel cell, comprising:

(A) a membrane electrode assembly disposed within a fuel cell housing, including

(i) a protonically conductive, electronically non-conductive membrane electrolyte having an anode face and an opposing cathode face;

(ii) an anodic metallic diffusion layer disposed generally parallel to said anode face of said membrane electrode assembly and having a plurality of openings therein, [to allow] said openings being of a size so as limit mass transport of an associated fuel substance [to pass] therethrough to said anode face of said membrane electrode assembly to produce [said] electricity generating reactions [and to allow electrons] and to allow the mass transport of carbon dioxide produced in said reactions [to travel] away from said membrane electrode assembly;

(iii) an anode catalyst disposed generally between said anode face and said anodic metallic diffusion layer, and a cathode catalyst disposed generally between said cathode face of the protonically conductive, electronically non-conductive membrane electrolyte, and a cathode side of said housing, whereby electricity-generating reactions occur upon introduction of said associated fuel substance including anodic disassociation of said fuel substance into carbon dioxide, protons and electrons, and a cathodic combination of protons, electrons and oxygen from an associated source of oxygen, producing water; and

(B) a load coupled across an anode and cathode of said fuel cell, providing a path for said electrons produced at the anode by said electricity-generating reactions, to the cathode.

25. (Previously Added) The direct oxidation fuel cell as defined in claim 24 wherein

said openings in said anodic metallic diffusion layer comprise a plurality of pores formed in said anodic metallic diffusion layer.

26. (Previously Added) The direct oxidation fuel cell as defined in claim 24 wherein said anodic metallic diffusion layer comprises a porous metal that has openings therein to allow substances to pass through said openings.

27. (Previously Added) The direct oxidation fuel cell as defined in claim 24 wherein said anodic metallic diffusion layer is at least partially comprised of at least one of titanium, chromium, stainless steel and other alloys, or combinations thereof.

28. (Previously Added) The direct oxidation fuel cell as defined in claim 24 wherein said anodic metallic diffusion layer is at least partially comprised of a metallic material that does not substantially react with methanol, or other reactants and by products of the electricity generating reactions.

29. (Currently Amended) The direct oxidation fuel cell as defined in claim 24 wherein

said anodic metallic diffusion layer comprises a composition of [loose] pieces of metal bonded together that have spaces therebetween allowing substances to pass between the interstices formed by said spaces between metal pieces.

30. (Currently Amended) The direct oxidation fuel cell as defined in claim 24 wherein said anodic metallic diffusion layer is treated with a substance that renders at least a portion of the anodic metallic diffusion layer at least partially hydrophobic to control the flow of water while allowing the flow of gases.

31. (Currently Amended) The direct oxidation fuel cell as defined in claim 24 wherein said anodic metallic diffusion layer is treated with a substance that renders at least a portion of the anodic metallic diffusion layer at least partially hydrophilic to encourage the flow of at least one of fuel and water.

32. (Currently Amended) The direct oxidation fuel cell as defined in claim 24 wherein said anodic metallic diffusion layer is treated with a substance that renders a first portion of the layer hydrophobic and a second portion of the layer hydrophilic, to allow for the flow of water and fuel and the flow of gases in proportion to the portion that is hydrophilic and hydrophobic, respectively, throughout the anodic metallic diffusion layer.

33. (Previously Added) The direct oxidation fuel cell as defined in claim 25 wherein said pores are of more than one dimension.

34. (Previously Added) The direct oxidation fuel cell as defined in claim 33 wherein a group of said pores formed in said anodic metallic diffusion layer are of a larger size than a remaining group of said pores, and at least some of the pores of said larger size are treated with a hydrophilic material.

35. (Previously Added) The direct oxidation fuel cell as defined in claim 34 wherein at least some of said remaining group of pores are treated with a hydrophobic material.

36. (Currently Amended) The direct oxidation fuel cell as defined in claim 33 wherein at least some of said pores of said layer are treated with [Nafion], NAFION® or a substance that renders treated pores at least partially hydrophilic.

37. (Currently Amended) The direct oxidation fuel cell as defined in claim 33 wherein at least some of said pores of said layer are treated with [Teflon], TEFLON® or other hydrophobic agent to render treated pores at least partially hydrophobic.

38. (Currently Amended) The direct oxidation fuel cell as defined in claim 29 wherein said [loose] pieces of metal are bonded together by particle diffusion bonding techniques.

39. (Previously Added) The direct oxidation fuel cell as defined in claim 38 wherein said particles are treated by at least one of a hydrophobic substance and a hydrophilic substance.

40. (Previously Added) The direct oxidation fuel cell as defined in claim 24, wherein a first portion of said layer is treated with a hydrophobic substance, and a second portion of said layer is treated with a hydrophilic substance, to form a pattern in said metallic diffusion layer of areas of relative hydrophobicity and areas of relative hydrophilicity, to provide discrete paths through the metallic diffusion layer through which gaseous and liquid reactants and byproducts can pass.

41. (Previously Added) The direct oxidation fuel cell as defined in claim 24, further comprising:

a flow field plate disposed generally parallel to said anodic metallic diffusion layer, said flow field plate having channels formed therein to direct the flow of substances within said fuel cell across said anodic metallic diffusion layer.

42. (Previously Added) The direct oxidation fuel cell as defined in claim 24 wherein

said anodic metallic diffusion layer performs as a flow field plate and current collector to conduct electrons produced in said electricity generating reactions and said

load being coupled to said anodic metallic diffusion layer to provide a path for said electrons out of said fuel cell as the electricity is produced by said fuel cell.

43. (Previously Added) The direct oxidation fuel cell as defined in claim 42 wherein

said anodic metallic diffusion layer performing as said flow field plate and current collector includes channels formed therein to direct the flow of fuel to said anode face of said membrane electrode assembly.

44. (Currently Amended) The direct oxidation fuel cell as defined in claim 24 further comprising

a cathodic metallic diffusion layer disposed generally parallel to said cathode face of said membrane electrode assembly and having a plurality of openings therein, said openings being sized to limit the transport of oxygen to said cathode face [to allow oxygen to pass therethrough to said cathode face] of said membrane electrode assembly, and to control water in said fuel cell. [to travel away from said membrane electrode assembly].

45. (Currently Amended) The direct oxidation fuel cell as defined in claim 44 wherein

said openings in said cathodic metallic diffusion layer comprise a plurality of pores formed in said cathodic metallic diffusion layer, said pores being sized to limit the water released from the cathode aspect of the fuel cell.

46. (Currently Amended) The direct oxidation fuel cell as defined in claim 44 wherein

said cathodic metallic diffusion layer comprises a porous metal that has openings therein that allow substances to pass through said openings, said openings being sized to limit the water that is released from the cathode aspect of the fuel cell.

47. (Previously Added) The direct oxidation fuel cell as defined in claim 44 wherein

said cathodic metallic diffusion layer comprises a porous metal that has openings therein that allow removal of liquids from, and allow introduction of gases to the membrane electrode assembly.

48. (Currently Amended) The direct oxidation fuel cell as defined in claim 44 wherein said cathodic metallic diffusion layer is at least in part comprised of a material selected from the group consisting of nickel, copper, titanium, chromium, steel, stainless steel, and other [suitable] alloys and combinations thereof.

49. (Previously Added) The direct oxidation fuel cell as defined in claim 44 wherein said cathodic metallic diffusion layer is at least in part comprised of a material that does not substantially react with byproducts or substances, present on the cathode of the fuel cell.

50. (Currently Amended) The direct oxidation fuel cell as defined in claim 44 wherein

said cathodic metallic diffusion layer comprises a composition of [loose] pieces of metal bonded together that have spaces therebetween allowing substances to pass through the interstices formed by said spaces between said metal pieces, the spaces being sized to control the flow of water in said fuel cell.

51. (Previously Added) The direct oxidation fuel cell as defined in claim 44 wherein said cathodic metallic diffusion layer is treated with a substance that renders the layer at least partially hydrophobic, to allow the introduction of gases to the membrane electrode assembly.

52. (Previously Added) The direct oxidation fuel cell as defined in claim 44 wherein said cathodic metallic diffusion layer is treated with a substance that renders the

layer at least partially hydrophilic, to allow the removal of liquids from the cathode face of the membrane electrode assembly.

53. (Currently Amended) The direct oxidation fuel cell as defined in claim 44 wherein said cathodic metallic diffusion layer is treated with a first substance that renders a first portion of the cathodic metallic diffusion layer hydrophobic and a second substance that renders a second portion of the cathodic metallic diffusion layer hydrophilic, to balance the flow of water and the flow of gases throughout the cathodic metallic diffusion layer.

54. (Previously Added) The direct oxidation fuel cell as defined in claim 44 further comprising a second flow field plate that is disposed generally parallel to said cathodic metallic diffusion layer.

55. (Previously Added) The direct oxidation fuel cell as defined in claim 44 wherein

said cathodic metallic diffusion layer performs as a flow field plate and current collector, and said load being coupled to said cathodic metallic diffusion layer to provide a path for electrons to travel to the cathode where it combines with oxygen at said cathode side of said fuel cell, producing water.

56. (Previously Added) The direct oxidation fuel cell as defined in claim 55 wherein

said cathodic metallic diffusion layer performing as said flow field plate and current collector has channels formed therein to direct the flow of oxygen across the cathode face of said membrane electrode assembly.

57. (Previously Added) The direct oxidation fuel cell as defined in claim 24 wherein said anodic metallic diffusion layer is at least in part comprised of a material having properties that improve conductivity.

58. (Previously Added) The direct oxidation fuel cell as defined in claim 24 wherein said anodic metallic diffusion layer is treated or coated with a material to provide improved conductivity.

59. (Previously Added) The direct oxidation fuel cell as defined in claim 44 wherein said cathodic metallic diffusion layer is at least in part comprised of a material having properties that improve conductivity.

60. (Previously Added) The direct oxidation fuel cell as defined in claim 24 wherein said cathodic metallic diffusion layer is treated or coated with a material to provide improved conductivity.

61. (Previously Added) The direct oxidation fuel cell as defined in claim 24 wherein

said fuel substance is a liquid carbonaceous fuel substance.

62. (Previously Added) The direct oxidation fuel cell as defined in claim 24 wherein

said fuel substance is selected from the group consisting of methanol, ethanol, propanol, butanol and aqueous solutions thereof and combinations thereof.

Claims 63-110 (Non-Elected, with Traverse).

111. (New) The direct oxidation fuel cell as defined in claim 24 further comprising:

an additional layer, disposed between said anodic metallic diffusion layer and said anode catalyst, of at least one of the following:

(i) carbon paper; and

(ii) carbon cloth.

112. (New) The direct oxidation fuel cell as defined in claim 44 further comprising:

an additional layer, disposed between said cathodic metallic diffusion layer and said cathode catalyst, of at least one of the following:

(i) carbon paper; and

(ii) carbon cloth.

113. (New) The direct oxidation fuel cell as defined in claim 44 wherein said cathodic metallic component is substantially hydrophilic.